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The hydrodynamics of chiral micro-swimmers ERIC KEAVENY, SHAWN WALKER, MICHAEL SHELLEY, Courant Institute of Mathematical Sciences, New York University — Many species of bacteria utilize rotating rigid helical flagella to propel themselves in a low Reynolds number environment. Recent experiments demonstrate that artificial micro-swimming employing this kind of locomotion is realizable by using magnetic fields to rotate colloidal structures that possess chiral symmetry. We perform a series of numerical simulations to investigate the hydrodynamics of the helical shapes found in natural swimmers as well as those developed for artificial systems. We quantify the dependence of the rotation-translation coupling on the geometry of the swimmer and assess the hydrodynamic efficiency for different chiral shapes. From this analysis, we identify optimal shapes and provide insight into artificial micro-swimmer design.

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